UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,602	10/18/2005	Masaya Kato	ASAIN0169	6018

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EXAMINER
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ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS,
WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 October 2005*.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1,3,5 and 7* is/are rejected.
7)☒ Claim(s) *2, 4, 6* is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *18 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☒ All   b)☐ Some * c)☐ None of:
1.☒ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date *4/13/06, 1/16/07*.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to the submission filed on 10/18/2005, with foreign priority date

5/9/2003. Claims 1-7 are presented for examination.

Information Disclosure Statement

1.   The information disclosure statements filed 4/13/06 and 1/16/2007 fails to comply with

the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because numerous references lack a date,

and have thus been "lined out". It has been placed in the application file, but the information

referred to therein has not been considered as to the merits. Applicant is advised that the date of

any re-submission of any item of information contained in this information disclosure statement

or the submission of any missing element(s) will be the date of submission for purposes of

determining compliance with the requirements based on the time of filing the statement,

including all certification requirements for statements under 37 CFR 1.97(e). See MPEP

§ 609.05(a).

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
> any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
> requirements of this title.

2.   Claim 7 is rejected under 35 U.S.C. 101 because the claimed invention is directed to

non-statutory subject matter. Claim 7 recites a program for performing various steps. Programs

are not sufficient to be considered statutory subject matter. Although the claim states that the

program uses a computer, the claim itself is directed towards the program.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

3.   This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c)

and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4.   Claims 1, 3, 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over

"Tetrahedral Finite Element Mesh Generation from NURBS Solid Models" ("Gürsoy") in view

of "Dual Contouring of Hermite Data" ("Ju").

5.   Gürsoy discloses octree division of data and cell classification. However, Gürsoy does

not disclose simulation of cell data. Ju discloses simulating texturing a portion of the contours of

the model.

6.   Gürsoy and Ju are analogous art because they are both related to the field of mesh

models.

7.   Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to combine the simulation of Ju with the octree division and cell

classification of Gürsoy, motivated by the desire to use a "numerically stable representation" (Ju,

Introduction).

8.   Regarding claims 1 and 7, Gürsoy and Ju teach:

A method for labeling multi material data, for a sequence of processing steps using a computer
(Gürsoy: Intro, "discretization of solid models", "computer-aided engineering"), the steps
including acquisition of external data (12) *(Gürsoy: page 213, "mesh nodes that are input")*,
storage of cell data through octree division of the external data *(Gürsoy: page 216, column 1,
"octree structure is subdivided")*, and simulation using the cell data *(Ju: page 343, column 1,
"simulate texturing a portion of the contour")*, the method comprising:

an external data acquisition step (S1) of acquiring the external data (12) composed of boundary
data and physical property values of an object (1) *(Gürsoy: page 216, section 3.2, "input
boundary nodes")*;

an external data input step (A) of inputting the external data (12) into a computer *(Gürsoy: page
216, section 3.2, "input boundary nodes")*;

a cell division step (B) of dividing the external data into rectangular solid cells (13) *(Gürsoy:
Figure 5, "Subdivisions of regular and irregular tetrahedra")*having boundary planes
orthogonal to each other *(Gürsoy: page 214, column 2, "cell is of type boundary")*;

a cell classification step (C) of classifying each of the divided cells into a boundary cell (13a)
including the boundary data, and a non-boundary cell (13b) not including the boundary data
*(Gürsoy: page 214, column 2, "cells are classified with respect to the interior of the surface
triangulation. If a terminal cell contains a surface node or intersects some of the surface
triangles then the cell is of type boundary. Non-boundary terminal cells are of type either in or
out")*;

a space classification step (D) of classifying the vertices of each cell into multiple spaces
partitioned by the boundary data *(Gürsoy: page 223, "An edge is defined in terms of two vertices
and it points to one of the adjacent facets")*;

a simulation step (S3) of performing a simulation using the physical property values for each cell
(Ju: page 343, column 1, "simulate texturing a portion of the contour"); and

an output step (S4) of outputting simulation results *(Ju: page 343, column 1, "simulate texturing
a portion of the contour")*,

wherein the cell classification step (C) comprises the steps of: further classifying each of the boundary cells (13a) into a first type cell and a second type cell, the first type cell having a cutting point at which an edge line or vertex is cut by the boundary data, the second type cell having a cutting point that lies on a boundary with another cell of different hierarchy, and the second type cell being larger than the another cell *(Gürsoy: Figure 4, "Figure 4 illustrates this process. A polygon and is spatial decomposition can be used as a two dimensional analogue of the polytree representation. In this example, cell c_o is out, cell c_b is boundary and cell c_i is in. A point P contained in a boundary cell such as c_b is classified by means of only those line segments (triangles in 3D space) that intersect the cell c_b")*; and

assigning a material number to each cell vertex *(Gürsoy: page 216, "number of all terminal tetrahedra")*.

9.   Regarding claim 3,

A method for labeling multi material data according to claim 2, wherein the boundary cell setting step (D2) comprises a step of assigning a vertex matching the boundary data either of the space numbers of two neighboring non-boundary cells *(Gürsoy: page 223, "An edge is defined in terms of two vertices, and it points to one of the adjacent facets")*.

10.   Regarding claim 5

A method for labeling multi material data according to claim 1, wherein the division step (B) comprises a step of dividing voxel data into rectangular solid cells (13) of the same size *(Gürsoy: Figure 1 depicts rectangular (square) cells)*.

Allowable Subject Matter

11.   Claims 2, 4 and 6 are objected to as being dependent upon a rejected base claim, but

would be allowable if rewritten in independent form including all of the limitations of the base

claim and any intervening claims.

Additional Pertinent Art

12.   The prior art made of record and not relied upon is considered pertinent to applicants

disclosure.

- US 2003/0028090: A method supplies a dynamic vector map of properties within a region or a unified suite of quantification functionality for property functions, such as density functions, conduction functions, defined on, defined in or defining a three-dimensional space, which functions may optionally vary in time.
- US 6,529,192: A mesh generator and process based on a volumetric representation is disclosed. According to one aspect of the present invention, a 3D region of an object is generated by a space carving process and represented by volumetric cells encoded in a tree structure, such as an octree tree. Given the 3D region, the mesh process generates a mesh of elements covering the entire 3D region and intersecting with each other either not at all or at common boundary faces.
- US 7,388,584:   A method for determining insides and outsides of boundaries includes an external data input step of inputting external data constituted by boundary data of objects, a cell division step of dividing the external data into rectangular parallelepiped cells having boundary planes orthogonal to each other, a cell classification step of classifying the cells into a boundary cell that includes the boundary data and a non-boundary cell that does not include the boundary data, and a space classification step of classifying the non-boundary cells into a plurality of spaces that are partitioned by the boundary cells.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to NITHYA JANAKIRAMAN whose telephone number is

(571)270-1003. The examiner can normally be reached on Monday-Thursday, 8:00am-5:00pm,

EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Paul Rodriguez can be reached on (571)272-3753. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nithya Janakiraman/
Examiner, Art Unit 2123

/Paul L Rodriguez/
Supervisory Patent Examiner,
Art Unit 2123